

Application/Control Number: 09/929,291  
Examiner/Art Unit: F.L.Lagman/3673  
Applicants: Vought and Flowers

Response Page 2  
Response date: 12/4/03

**Removable Maintenance Port and Method for Rehabilitating Manhole**

than the interior diameter of said top unit;  
said base unit substantially permanently embedded into a  
surface below the underground pipes;  
said base unit having a similar geometry to said top unit;  
said top unit disposed so that said top unit fits over said  
base unit; and  
a means for sealing the space between the exterior of said  
base unit and the interior of said top unit,  
whereby the apparatus provides access to the underground  
pipes.

25. An apparatus according to claim 24, wherein the top unit has  
an exterior top flange.
26. An apparatus according to claim 25, wherein the top unit has  
an internal lower flange wherein the diameter of said  
internal flange is less than the diameter of the base unit  
upon which said top unit will rest.

Application/Control Number: 09/929,291  
Examiner/Art Unit: F.L.Lagman/3673  
Applicants: Vought and Flowers

Response Page 3  
Response date: 12/4/03

**Removable Maintenance Port and Method for Rehabilitating Manhole**

27. A removably insertable apparatus for accessing underground pipes comprising:

an annular, hollow top unit made of a corrosion resistant load-bearing composite material, the interior diameter of which exceeds the exterior diameter of an annular, hollow base unit, wherein said top unit has an exterior top flange, and further wherein said top unit has an internal lower flange wherein the diameter of said internal flange is less than the diameter of the base unit upon which said top unit will rest, and further wherein said top unit has pre-formed stubout holes that permit said top unit to cover substantially the entire part of said base unit that contains connections to any underground pipes;

said base unit made of a corrosion resistant load-bearing composite material, exterior diameter of which is less than the interior diameter of said top unit;

said base unit substantially permanently embedded into a

**Removable Maintenance Port and Method for Rehabilitating Manhole**

surface below the underground pipes;

said base unit having a similar geometry to said top unit;

said top unit disposed so that said top unit fits over said base unit; and

a means for sealing the space between the exterior of said base unit and the interior of said top unit, whereby the apparatus provides access to the underground pipes.

28. An apparatus according to claim 27, wherein the top unit has a lower external flange at the bottom of the top unit.

29. An apparatus according to claim 24, wherein the top unit has an internal lower flange whereby the diameter of said internal flange is less than the diameter of the base unit upon which said top unit will rest.

30. A removably insertable apparatus for accessing underground pipes comprising:

Application/Control Number: 09/929,291  
Examiner/Art Unit: F.L.Lagman/3673  
Applicants: Vought and Flowers

Response Page 5  
Response date: 12/4/03

**Removable Maintenance Port and Method for Rehabilitating Manhole**

an annular, hollow top unit made of a corrosion resistant load-bearing composite material, the interior diameter of which exceeds the exterior diameter of an annular, hollow base unit, and further wherein said top unit has pre-formed stubout holes that permit said top unit to cover substantially the entire part of said base unit that contains connections to any underground pipes;

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said base unit made of a corrosion resistant load-bearing composite material, exterior diameter of which is less than the interior diameter of said top unit;

said base unit substantially permanently embedded into a surface below the underground pipes;

said base unit having a similar geometry to said top unit;

said top unit disposed so that said top unit fits over said base unit; and

a means for sealing the space between the exterior of said base unit and the interior of said top unit, whereby the apparatus provides access to the underground pipes.

Application/Control Number: 09/929,291  
Examiner/Art Unit: F.L.Lagman/3673  
Applicants: Vought and Flowers

Response Page 6  
Response date: 12/4/03

**Removable Maintenance Port and Method for Rehabilitating Manhole**

31. A removably insertable apparatus for accessing underground pipes comprising:

an annular, hollow top unit made of a corrosion resistant load-bearing composite material, the interior diameter of which exceeds the exterior diameter of an annular, hollow base unit, wherein said top unit has an exterior top flange, and further wherein said top unit has pre-formed stubout holes that permit said top unit to cover substantially the entire part of said base unit that contains connections to any underground pipes;

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said base unit made of a corrosion resistant load-bearing composite material, exterior diameter of which is less than the interior diameter of said top unit;

said base unit substantially permanently embedded into a surface below the underground pipes;

said base unit having a similar geometry to said top unit;

said top unit disposed so that said top unit fits over said base unit; and

Application/Control Number: 09/929,291  
Examiner/Art Unit: F.L.Lagman/3673  
Applicants: Vought and Flowers

Response Page 7  
Response date: 12/4/03

**Removable Maintenance Port and Method for Rehabilitating Manhole**

a means for sealing the space between the exterior of said base unit and the interior of said top unit, whereby the apparatus provides access to the underground pipes.

32. An apparatus according to claim 24, wherein the base unit further comprises a bottom external flange.
33. An apparatus according to claim 24, wherein the base unit further comprises stubout holes with means for connecting the underground pipes through said holes.
34. An apparatus according to claim 32, wherein the base unit further comprises stubout holes with means for connecting the underground pipes through said stubout holes.
35. An apparatus according to claim 34, wherein the means for connecting the underground pipes comprises commercially available T-type fittings with a means for sealing the T-

Application/Control Number: 09/929,291  
Examiner/Art Unit: F.L.Lagman/3673  
Applicants: Vought and Flowers

Response Page 8  
Response date: 12/4/03

**Removable Maintenance Port and Method for Rehabilitating Manhole**

type fittings to the base unit.

36. An apparatus according to claim 25, wherein the external top flange of the top unit further comprises an external support for said top flange.

37. A removably insertable apparatus for accessing underground pipes comprising:

an annular, hollow top unit made of a corrosion resistant load-bearing composite material, the interior diameter of which exceeds the exterior diameter of an annular, hollow base unit, wherein said top unit has an exterior top flange, and further wherein said top unit is pre-formed so that it is narrower at the top, immediately prior the external flange, such that said external flange does not require any external support;

said base unit made of a corrosion resistant load-bearing composite material, exterior diameter of which is less than

Application/Control Number: 09/929,291  
Examiner/Art Unit: F.L.Lagman/3673  
Applicants: Vought and Flowers

Response Page 9  
Response date: 12/4/03

**Removable Maintenance Port and Method for Rehabilitating Manhole**

the interior diameter of said top unit;  
said base unit substantially permanently embedded into a  
surface below the underground pipes;  
said base unit having a similar geometry to said top unit;  
said top unit disposed so that said top unit fits over said  
base unit; and  
a means for sealing the space between the exterior of said  
base unit and the interior of said top unit, whereby the  
apparatus provides access to the underground pipes.

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38. A removably insertable apparatus for accessing underground  
pipes comprising:  
an annular, hollow top unit made of a corrosion resistant  
load-bearing composite material, the interior diameter of  
which exceeds the exterior diameter of an annular, hollow  
base unit, wherein said top unit has an exterior top flange,  
and further wherein the external flange further comprises  
pre-existing holes;



**Removable Maintenance Port and Method for Rehabilitating Manhole**

said base unit made of a corrosion resistant load-bearing composite material, exterior diameter of which is less than the interior diameter of said top unit;

said base unit substantially permanently embedded into a surface below the underground pipes;

said base unit having a similar geometry to said top unit;

said top unit disposed so that said top unit fits over said base unit; and

a means for sealing the space between the exterior of said base unit and the interior of said top unit, whereby the apparatus provides access to the underground pipes.

39. An apparatus according to claim 24, wherein the top unit further comprises an internal flange at the top of said top unit.

40. A removably insertable apparatus for accessing underground pipes comprising:

**Removable Maintenance Port and Method for Rehabilitating Manhole**

an annular, hollow top unit made of a corrosion resistant load-bearing composite material, the interior diameter of which exceeds the exterior diameter of an annular, hollow base unit;

said base unit made of a corrosion resistant load-bearing composite material, exterior diameter of which is less than the interior diameter of said top unit;

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said base unit substantially permanently embedded into a surface below the underground pipes;

said base unit having a similar geometry to said top unit;

said top unit disposed so that said top unit fits over said base unit;

a means for sealing the space between the exterior of said base unit and the interior of said top unit, whereby the

apparatus provides access to the underground pipes; and

further comprising a spacer unit made of a corrosion

resistant load-bearing composite material, such that the

interior diameter of said spacer unit exceeds the exterior

Application/Control Number: 09/929,291  
Examiner/Art Unit: F.L.Lagman/3673  
Applicants: Vought and Flowers

Response Page 12  
Response date: 12/4/03

**Removable Maintenance Port and Method for Rehabilitating Manhole**

diameter of said base unit, and such that the exterior diameter of said spacer unit is smaller than the interior diameter of said top unit.

41. An apparatus according to claim 40, wherein the spacer unit comprises a flat top surface.

AI 42. An apparatus according to claim 40, wherein the spacer unit comprises a beveled top surface.

43. A method for rehabilitating manhole structures, comprising the steps of:

- a. removing the old underground pipes, connectors, and T-type inserts from inside the bottom of the manhole structure;
- b. leaving the remaining elements of said manhole structure in place and otherwise intact;
- c. preparing the bottom of said manhole structure by

**Removable Maintenance Port and Method for Rehabilitating Manhole**

clearing the debris out of said manhole structure down to the bottom of said manhole structure;

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- d. inserting the base unit into said manhole structure;
  - e. embedding said base unit into the bottom of said manhole structure by a substantially permanent means for securing said base unit;
  - f. connecting said underground pipes already in place to said base unit;
  - g. sealing the connections between said underground pipes and said base unit;
  - h. backfilling around said base unit with an inert material;
  - i. mechanically tamping said inert material around said base unit;
  - j. adding additional inert material to bring the top fill line of said inert material to a location slightly above the lowest exposed part of the exterior of said base unit;

**Removable Maintenance Port and Method for Rehabilitating Manhole**

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- k. placing a means for sealing the top unit with said base unit, so that said means for sealing is disposed below the top of the highest elevation of said base unit;
  - l. disposing said top unit over the top of said base unit wherein the inner diameter of said top unit is greater than the outer diameter of said base unit;
  - m. replacing the pre-existing means for securing said manhole structure;
  - n. re-surfacing the ground access to said manhole structure so that the highest elevation of said means for securing said manhole structure is disposed below the surface of the ground access;
  - o. replacing the means previously used for sealing said manhole structure over said means for securing the top of said manhole structure; and
  - p. affixing said means for sealing said manhole structure whereby said means is substantially permanent.